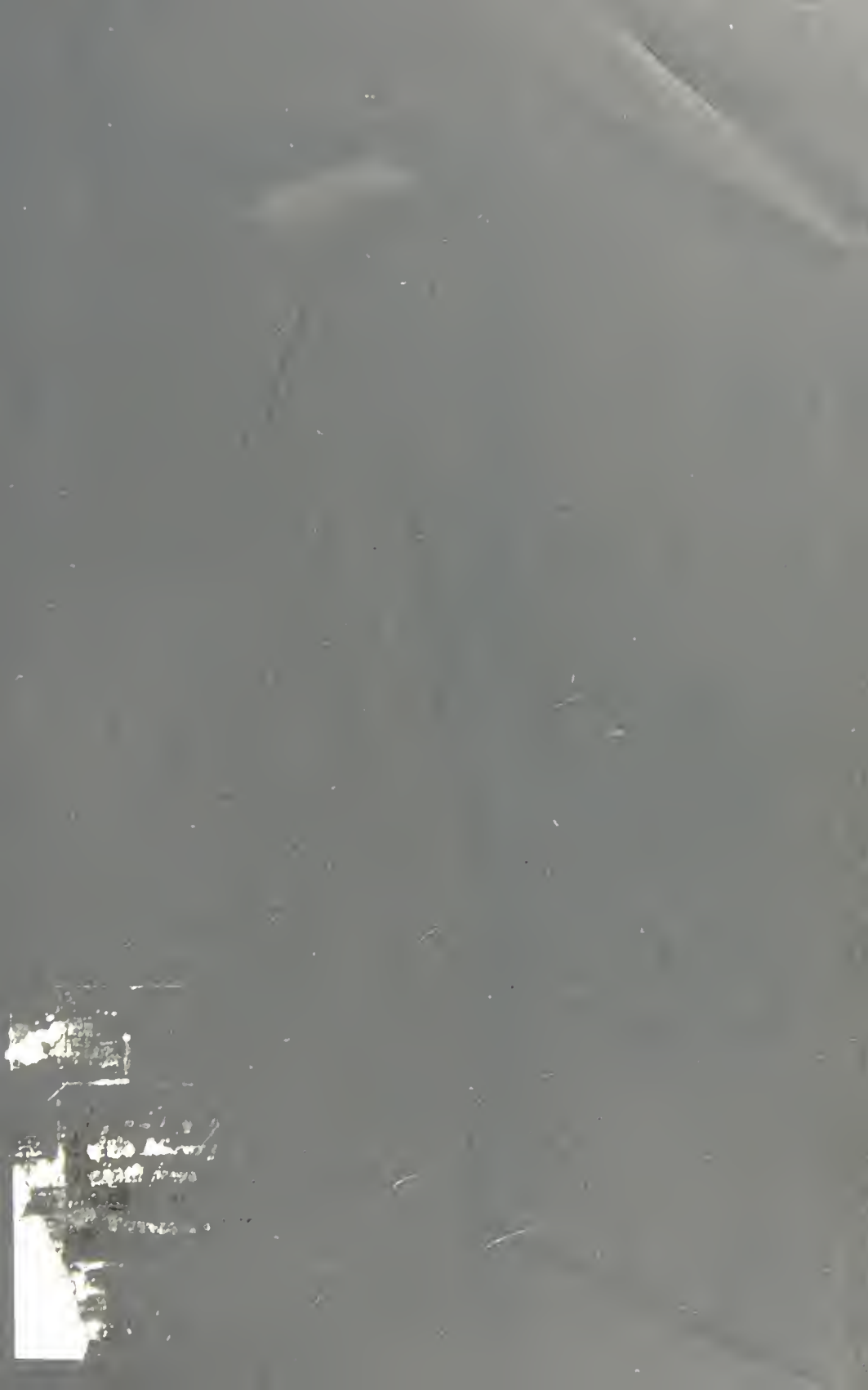


THE
PREVENTIVE TREATMENT
OF
CALCULOUS DISEASE

THOMPSON






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CALCULOUS DISEASE



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ON
THE PREVENTIVE TREATMENT
OF
CALCULOUS DISEASE
AND
THE USE OF SOLVENT REMEDIES

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THIRD EDITION

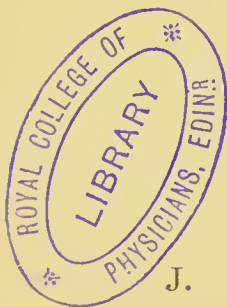


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PREFACE

TO

THE THIRD EDITION.



THIS little work consists of three lectures, the 24th, 25th, and 26th, taken from the Eighth Edition of my 'Clinical Lectures' now passing through the press. Two of them are designed to illustrate a method of treating excessive excretion of uric acid in the adult, which I have largely and systematically adopted for more than twenty years. It has been so successful that I desire to bring it more fully than heretofore under the notice of my brethren. I have therefore given fuller details in the present issue respecting diet, regimen and

therapeutic agents than in the editions which have preceded it. The question of solvents for calculi so naturally allies itself with the foregoing that the lecture devoted to that subject is appended.

35 WIMPOLE STREET :

July 1888.

CONTENTS.



LECTURE	PAGE
I. EARLY HISTORY OF CALCULOUS DISEASE, AND THE TREATMENT BEST ADAPTED FOR ITS PREVENTION	1
II. THE DIETETIC TREATMENT OF PATIENTS EXCRETING URIC ACID IN EXCESS . . .	40
III. ON THE TREATMENT OF STONE IN THE BLADDER BY SOLVENTS: ITS HISTORY AND PRACTICE	59

ON THE
PREVENTIVE TREATMENT
OF
CALCULOUS DISEASE.

LECTURE I.

EARLY HISTORY OF CALCULOUS DISEASE, AND THE
TREATMENT BEST ADAPTED FOR ITS PREVENTION.

GENTLEMEN,—We have had opportunities recently of studying together, and of examining very fully, the various operative proceedings which are generally practised for the removal of stone from the bladder; and you have had the opportunity of seeing them performed many times, not fewer than eleven cases having passed through my wards during the last three weeks, and that each has been brought to a successful conclusion.

But, satisfactory as such a result is, it is impossible not to feel convinced that there is still an

important question in relation to the treatment of this complaint which has not yet been adequately answered. And it raises an issue not less weighty, nor less intimately affecting the patient's welfare than any one of the subjects we have hitherto discussed.

The question I propose for solution is this :—

Is there not a period in the history of the process which leads to the formation of renal or vesical calculus, whether in the condition of gravel, concretion, or stone, at which it might be possible to prevent the development of a considerable deposit and the necessity for mechanically removing it?

Admirable as it must be admitted are the results of modern operative procedure, whether by the lithotrite or by the scalpel, and great as is the triumph which surgery has achieved in the art of removing stone from the bladder, I take it there are very few men who would not desire to avoid, if any means of doing so were available, the opportunity of personally illustrating these glorious successes of our craft.

There is not one among us, indeed, who would not infinitely prefer to be furnished with the means of controlling or preventing the formation of cal-

culus, on the first appearance of evidence that such a contingency is imminent or likely to occur.

I reply to the question before us, by a distinct assurance that we have the power to check the production of calculous matter at almost any stage of the complaint, and almost certainly to render it impossible, if proper treatment be adopted.

Before, however, entering on the details of the plan by which this result may be effected, I must first remark that there are, as you know, several varieties of calculus, and you may naturally ask, are all these equally amenable to treatment? For our purpose now, it suffices to regard all calculi as generally divided into two classes: those which have a local, and those which have a constitutional origin. By 'local,' I mean formed by diseased action in the bladder itself, and not depending upon any constitutional conditions or tendencies; and by 'constitutional,' I mean formed by some vicious action, some error of assimilation which has become more or less inherent in the system. Now, the large majority of renal and vesical calculi are of constitutional, and not of local origin. When they are local, we can do little to prevent their formation except by mechanical means. Calculous

matter, the elements of which are produced in the bladder, may be washed out, or be broken or dissolved, and then washed out. But when stones are of constitutional origin—and we are going to refer entirely to these to-day—their component elements are separated from the blood, and no mechanical mode of preventing their production can by any possibility be available at this early stage.

Now, from observation, we know that nineteen out of twenty of such stones have uric acid for their basis, the remaining one in twenty being oxalate of lime;¹ and, less commonly still, there are phosphatic stones which are of constitutional origin also. Therefore, practically, to all intents and purposes, the problem before us is contained in the question: How may we best prevent the formation of uric-acid calculus?

Let us examine the early history of a case of persisting uric-acid deposit. First of all, let me say that, with some individuals in whom the tendency to manifest it is very marked, it is often

¹ The deposits of oxalate of lime and of uric acid so often replace each other, that the consideration of the latter becomes practically generally sufficient for our purpose.

more or less hereditary. As an illustration on the spot, let me recall the man we have just seen with uric-acid calculus in the ward, of whom we learned that his father had 'gravel or stone for the last twenty years of his life.' And it is by no means an unusual experience, that either calculus or gout—more commonly the latter—has been observed in the family of the patient who comes to us with one of these formations in the bladder. We speak of tubercular disease and of cancer as being transmitted by blood-relationship, especially the former; but it is probably not more strongly hereditary than the disposition to uric-acid deposits in one form or another. I have made a point of asking the question of all patients who come to me with this complaint; and although I cannot furnish you with an exact numerical statement, I do know that in many, either gout or gravel (for I wish to show you the identity in regard to origin of these two complaints) has existed in the preceding generation. This hereditary tendency varies in force or strength in different families. You will find some persons with persisting uric acid deposits at thirty years of age or sooner, others at forty, others not until sixty. Of course, the earlier the age at which it appears,

6 EARLY HISTORY OF CALCULOUS DISEASE

the stronger you will infer the hereditary disposition to be, and the more obstinate, probably, will be its tendency to persist.

What, then, are the first signs of this condition in the patient? The first thing which excites his attention, usually, is the frequent occurrence of a pinkish deposit at the bottom of the vessel in which urine has stood, often staining the surface more or less. Or, the secretion, passed originally perfectly clear and healthy in tint, has become thick and opaque (sometimes almost resembling a mixture of rhubarb and magnesia) soon afterwards. Or sometimes a delicate film or pellicle appears, and covers it, exhibiting a faint play of prismatic colours. In fact, these changes occur on the cooling of the urine under certain conditions. These phenomena therefore may appear more frequently in winter than in summer, because the external temperature is lower. The change consists in a deposit of salts from a hot solution, as the liquid cools; the deposit being easily re-dissolved by raising the temperature of the urine to that at which it was originally passed, when it regains also its original transparency. The condition here described very often and very unnecessarily excites much anxiety on the

part of the patient ; but only a very marked and persisting condition of it can be regarded as a sign of what by some is called ' the uric-acid diathesis.' Mind, I mean strictly persistence, or at all events frequency of occurrence: for you or I, with no hereditary predisposition, may take a little more beer, or a heavier dinner, than usual, or an extra glass of champagne, or a glass or two of extraordinary port, and may find next morning a considerable quantity of this pinkish deposit, or the urine looking almost like pea-soup, but not so thick, and when the vessel is tilted on one side, a tidal mark, so to speak, is seen, showing the height at which the liquid stood ; all this, as I said before, being redissolved by heat. The same condition may occur also after unusual exercise which has produced abundant sweating, so that only a small quantity of water is available in the system for the solution of the urine salts, and the secretion is high-coloured, and contains an unusual proportion of solids. In either case the opacity of the liquid, as well as its tint, which may vary from fawn to dull red, are due to the unduly large production of the mixed urates ; that is, urates of soda, potash, lime, &c. But if, without any errors of diet,

among which any but a very small allowance of alcoholic drink is only one, a patient habitually passes this kind of urine—if in time there frequently arrives also a deposit of uric acid, manifested by the presence of little crystals, looking like particles of cayenne pepper, or red brick-dust, at the bottom of the vessel—when this occurs rather early in life, say before forty, we cannot doubt that there is an undue tendency to produce uric acid, either inherited or acquired. For this tendency may no doubt be acquired, or a pre-existing habit may be intensified; indeed, it is often the result solely of improper diet and regimen. I now show you a specimen of urine quite cloudy with mixed urates, although you must be familiar with it in the wards, and also with the fact that on heating the liquid it again becomes clear, and that in a short time, while we are talking, if the room is cold, it may again become cloudy on cooling. Let me once more remind you that this may occasionally happen with the most healthy individual; and it is only the persistence of the symptom, without any flagrant errors of diet, which should lead you to suspect it to be a constant condition that requires treatment.

We have followed the complaint up to the formation of cayenne pepper crystals. Of this deposit I have some very good specimens here, which have been collected from patients who passed it habitually. These consist mainly of the transparent rhomboidal uric-acid crystals, which you know to be very beautiful objects under the microscope. They may be passed almost daily and habitually by some persons, and without any sense of discomfort, or occasion for complaining. Other persons may pass this material periodically in large quantity, little or none of the deposit being observed during the interval. At such periods, the patient often experiences pain in the back, or over one hip, with uneasiness extending to the groin and testicle, all this perhaps accompanied by sickness or nausea; and he may then be said to have a mild attack of sand or gravel. He feels relieved after the occurrence, which, just as a storm is said to clear the air, has freed him for a time from the effect of accumulation of morbid matter in the system. Sometimes, however, the symptoms are much more severe, and are often then believed necessarily to denote the passage of a renal calculus. But I have satisfied myself, after very large opportunities of

observation, that in the great majority of these attacks, the patients have been merely the subjects of a 'uric-acid storm,' if I may use the expression; and that calculous matter has been eliminated in a soluble condition, although the process has been accompanied by pains sufficiently severe to arouse the suspicion that some concrete form of gravel has been passed, or has at all events been formed. These phenomena occur at varying intervals, and usually become more frequent or severe, unless the patient does something to prevent their occurrence. Subsequently, he may pass tiny calculi, which have the appearance of being rounded, or, at other times, rough and irregular aggregations of the same crystals. Or at a later period these bodies tend in time to become larger, as large as small peas, or even beans; still specimens of the same product—that is, of uric acid, associated more or less with an alkaline base, such as those above named. Their transit from the kidney to the bladder may be accompanied by excruciating pain in the regions already mentioned, and by severe vomiting, lasting a few hours; after which relief often occurs somewhat suddenly. At the same time there are many large specimens of such 'gravel' or small calculi passed

without the patient being aware of the fact until he sees them excreted. Indeed it is by no means unusual, even in those instances where patients have voided such small bodies for a period of several years, that no pain or other sign of their existence is observed throughout. Where, however, the transit of the calculus is painful or difficult, some signs of it are generally manifest in the urine. Sometimes it is scanty, and merely very high coloured; at others it is tinged with blood, and not uncommonly it deposits blood in that dark form which is described as resembling 'coffee grounds.'

Here, let me recall for one moment what I said as to the relation between gout and uric-acid deposit. I have sometimes seen these two complaints alternating, comparing one generation with another; gout, in its ordinary form of attack in the great toe, appearing in the one, gravel in the second, and gout again in the third. But the same individual may also have alternating attacks of gout and gravel. I have seen a patient who had suffered for years from gout become free from his attacks without known cause for several months, when he developed for the first time a uric-acid stone in the bladder. Lastly, the so-called 'chalk-stones,' which

you have often seen infesting the knuckles and disfiguring the hands of elderly people in advanced stages of gout, are composed of the same material—that is, of uric acid, usually as urate of soda. The identity of gout and uric acid gravel, then, is unquestionable; they constitute two different series of phenomena, but both spring from one and the same root.

Now, what is the best mode of dealing with those patients who habitually pass the cayenne pepper crystals of uric acid, or the small calculi? What mode of treatment will help to prevent the arrival of at least the advanced condition—namely, that of calculus too large to be voided by the patient? Generally speaking, I think such patients come under observation in a tolerably early stage, although it is obvious this is by no means always the case. Some are unnecessarily alarmed at a very early period, when the urine is only occasionally thick with urates. They are apt to mistake the opaque secretion for some important manifestation of morbid matter, and to become greatly disturbed in consequence. Indeed, some patients become almost hypochondriac through not knowing that such deposits are of little consequence at first, and

can be easily treated. It is necessary to correct these false impressions, and explain the nature of the product, that in itself it is not a diseased one, only a normal constituent in larger quantity than is desirable. They should be made to understand that the original and normal form of urine is a more or less crystalline solid, that it is indeed passed thus by many animals ; while in others, like ourselves, it must be first converted into a solution for convenience of storing in a bladder. This solution, then, owing to irregularities in diet, &c., occasional or habitual, varies in strength ; and sand, gravel, or calculus can only be formed when the solution is maintained by undesirable circumstances in a too concentrated state. The urine is then generally found to be very acid to tests : of course, uric acid being in large quantity, that condition is a natural sign of its presence. It is little the worse for this perhaps ; the bladder mostly tolerates a urine of full acidity quite as well or better than a neutral one. Nevertheless, the presence of a full proportion of acid has come to be regarded as sufficing to establish a principle, somewhat a crude one, of treating the complaint ; and one almost universally adopted. In the circumstances described

the patient has generally been prescribed the continuous use of alkalies. While, on the other hand, and with even less reason for such a course, when the urine is neutral or alkaline, mineral acids are persistently administered. This simple—indeed, too simple—view of the matter often dominates the whole of the treatment. In the former case, a certain quantity of potash, bicarbonate or citrate, or of soda, or of lithia; or benzoate of ammonia is administered for a long period; or the natural waters of Vichy, Evian, or Vals (carbonate of soda), Contrexéville (sulphate of lime chiefly, with carbonate of soda), or some other alkaline spring, are largely given; or the patient is perhaps sent to drink the waters on the spot, there or elsewhere. The chief alkali is, as you see, carbonate of soda; whatever, however, be the form of it, provided enough be taken, these deposits will disappear; the uric acid will no longer be deposited; the urine will become less irritating; the annoying symptoms will be diminished or got rid of. And of course the patient is very much pleased with this new condition of clear urine and disappearance of all deposit. And you may naturally say, ‘What more can be desired?’ Much: you

have merely made his enemy disappear ; he is by no means rid of its presence, for you have not checked the acid formation. The uric acid is there, and probably in quantity as much as ever ; for the uric acid and urates are soluble in alkali, and you have only rendered them invisible. You really have the same condition as that described in the well-known fable of the ostrich, which is said to put its head into the bush when pursued by hunters, and, no longer seeing them, to believe itself secure. Just such is the security of the patient with uric acid who trusts solely to alkalies or to Vichy water. His surplus deposits have become unrecognisable by vision ; nothing more. I do not go so far as to say the alkalies have been absolutely unserviceable as regards his constitutional state, but they will not improve it to any great extent ; and when he leaves them off the acid shows itself again. And further, I believe there is reason to conclude that large quantities of alkali, habitually taken, exercise an undesirable influence, to say the least.

Diuretics have been employed on much the same principle, and may be regarded as no better than the alkalies. In those cases which are treated with such agents as nitrate or acetate of potash,

&c., the secretion of water is no doubt increased *quoad* the amount of solids, and the solids are thus dissolved. The same thing happens with that remarkably general and always popular diuretic, so punctually and faithfully swallowed by the patient who has once obtained any medical sanction for its use—I mean gin, or whisky and water. In all such instances, what has chiefly been done is to stimulate the kidneys, already perhaps overworked, to do more. You have by no means cured the patient of his gravel, and may be happy if he is no worse for the remedies.

I shall endeavour to give you a sketch of such views as I have been able to form of the pathology of these cases ; and, speaking now with more confidence, I shall be able to point out an efficient mode of treating them. The problem they present has been brought before me with great force and frequency, since for many years my advice has been urgently sought by the calculous patient, after operation, as to what he should do to avoid becoming the subject of another. And many others in the early stages have sought similar aid, naturally feeling that the subject must have engaged my attention, in the earnest hope that they might escape the advanced stage.

Using then only broad and simple terms, as our time here and, I may perhaps add, the extent of our knowledge will not permit me to be more minute or exact in detail, I shall premise that the origin of those well-known symptoms which all agree to recognise as gout, as well as of a superabundant uric-acid deposit in the urine, is due to defective assimilation on the part of organs associated with or forming the *primæ viæ*. I am quite aware that it is common in practice to speak somewhat confidently of the liver, its action, and its states, although we have probably still much to learn about these. Many years ago it was the custom to talk and act as if we were thoroughly acquainted with the liver and its functions; but during the last fifteen or twenty years new light has been thrown upon the subject by the laborious researches of Bernard, Pavy, and others, and we have thereby learned how little we certainly know of its natural functions, still less of its action in disease. Thus, in the department of practical medicine, all were agreed that if there was one fact more obvious than another—at least since the time of Abernethy—it was the specific influence of mercury on that organ. Nevertheless carefully

conducted inquiries render it doubtful whether the secretion of bile, at all events, is influenced by this agent in any degree whatever. There were other drugs, indeed, which were vaunted to take the place of mercury, yet always following at a humble distance, so to speak; but no one ever thought of disputing the fact that you could augment at will the bile secretion by administering that famous specific. I am not here to say whether that is so or not, but it seems to have been proved that there are substantial grounds for challenging our ancient faith in the doctrine so expressed. Observe that I have said nothing to underrate the value of the medicine in regard of symptoms popularly associated with defects of some kind in the liver.

Bear in mind, then, that in speaking of the 'defective action of the liver,' or of 'torpor of the liver,' I merely use provisional terms, which most will easily understand as indicating more or less distinctly a certain set of symptoms. Let them be briefly described as mainly consisting of a constant, or almost constant, deficient excreting function by the bowels, sometimes, but by no means always, associated with impaired appetite, perhaps headache, nausea, depression, inactivity, and other

signs of slow or uneasy digestion ; some of these being absent if the diet is carefully selected, or if the patient lives in the open air and takes much exercise. On the other hand, not only the deranged digestion, but pains in the back and limbs referred to as muscular, may be frequently present. I cannot positively state whether those phenomena are really due to inactivity of the organ in question ; practically, for us to-day, this does not signify much, but the current terms are still convenient formularies until better ones can be substituted for describing the condition in question.

Now, at the bottom of this tendency to uric-acid production there often lies what is thus understood as inactivity of the liver ; and the true rationale of the unduly large formation of the urinary salts appears to be, that the liver together with the skin or some other organ performing inefficiently its excreting function, the kidneys have more work than is natural thrown upon them. Thus the solid matters of the urine, or rather some of its ordinary constituents, are augmented—not all of them, for urea is not necessarily increased, but uric acid is largely produced, and is eliminated not only in solution but in crystalline forms. Uric

acid is very insoluble in water ; and although the quantity thrown out may be quite soluble at the natural temperature of the urine (99° Fahr.), when this diminishes to 60°, 50°, or 40°, the acid is deposited, and when the quantity becomes larger still, even the ordinary amount of fluid associated with it at a temperature of 99° will not suffice to dissolve the whole, and solid uric acid is deposited in some part of the urinary passages. This deposit may take place in the kidneys themselves, giving rise, if not thrown off, to the formation of calculus, at first renal, but sooner or later generally becoming vesical. Now, if all this be so, the formation of uric-acid gravel is not by any means to be regarded as necessarily disease of the kidney ; on the contrary, it may be regarded as the result of an active and capable organ vicariously relieving some other organ the function of which is torpid. The true remedy, therefore, is not to stimulate the kidneys, already overworked, by diuretics etc.—not, to use a familiar simile, to lash that horse of the team which is already doing too much work—but you are to seek the cause in that other one of the team which is doing deficient work, and that is,

either in part or wholly, almost invariably the liver, in the sense already explained.

The treatment, then, which I advise you to pursue is to employ such agents as will stimulate the excretory action by the *primæ viæ* without depressing vital power. No doubt that a powerful agent for the purpose is mercury; and it is quite unquestionable that relief of the symptoms above alluded to is to be obtained in a remarkable manner by occasional small doses of that agent. For our purpose, however, it is not always necessary to use it, and there is a widely spread belief, grounded, in my opinion, on the reckless mode of administering the drug commonly followed in the early part of this century, that it is mostly injurious or dangerous, and to be discarded if possible. No such objection at all events lies against another class of remedies, the prolonged use of which has been of great value, I mean certain kinds of natural mineral waters. These I regard as greatly superior for the cases in question to taraxacum, nitric acid, podophyllin, the alkalies, and other vaunted ‘substitutes for mercury’ as they are termed, in what is called ‘promoting the action of the liver.’

Now the mineral waters which I am about to describe belong to a group of springs marked by a common and distinctive character, since all contain in solution sulphate of soda in considerable quantity, together with a varying proportion of sulphate of magnesia, besides less important salts. In studying these waters I wish you to observe with me the composition of them, and at the same time to dismiss to a certain extent from your mind the estimate of medicinal doses which you have acquired in the dispensary, and which necessarily belong to it; since small quantities of drugs, as they exist in mineral waters, act more freely than the same quantities combined after the ordinary pharmaceutical method. You ask me for a demonstration, and I am quite ready to give it you. At the same time, let me caution you against regarding the small doses of mineral waters as having any affinity, either in the matter of quantity or by the principle which regulates their administration, with what is understood as an 'infinitesimal' dose. The difference may be illustrated thus: you know that you may give to A an ounce of 'Epsom salts' (sulphate of magnesia), or to B half an ounce; for individuals are very differently affected, and each is probably

freely purged ; but the same effect will be obtained with one-third or one-fourth of those quantities if the patient takes it as prepared in Nature's laboratory—that is, in the form of mineral water. It is a curious fact, which I give as an ultimate one, and without speculating here on the cause of the difference. As a proof of the superior force of the saline combinations found in natural springs, I may refer you to the following experiment. If you will reduce by careful evaporation, as I have done, such mineral waters to their pharmaceutical condition of crystallised salts, you will find that they possess no more power than similar salts obtained by the ordinary commercial processes, and met with in every chemist's shop. Having been separated by evaporation, they no longer act with the energy which belonged to them when in the state of solution which the natural spring produces. You will therefore readily understand that it may be essential, at all events that it is desirable, to employ the natural mineral waters ; since what are called 'artificial waters,' however admirably prepared, are simply pharmaceutical products, and are destitute of a remarkable quality which distinguishes the remedies they are designed to imitate.

Here is a table of the waters which I refer to, with a comparative synopsis of their distinguishing saline contents, representing the number of grains (without estimate of the chloride of sodium and other less active agents which are also present) in an English pint. Below these I add two well-known alkaline waters.

	Sul- phate of Soda	Su- phate of Mag- nesia	Car- bonate of Soda	Other Ingredients
<i>Saline :</i>	grs.	grs.	grs.	
Püllna	154	116	—	
Hunyadi Janos	150	148	—	
Friedrichshall	58	49	—	} Little iron
Marienbad (Kreuz) . .	48	—	9	
Carlsbad (Sprüdel) . .	25	—	13	} Little iron
Franzensbad	30	—	6	
<i>Alkaline :</i>				
Vichy (Célestins) about	3	—	47	Little iron
Vals (Madeleine) about	—	—	65	Little iron

The most concentrated water of the saline group is that of Hunyadi Janos, a Hungarian water which contains about two and a half drachms each of sulphate of soda and sulphate of magnesia in an English pint; next, and nearly equal to it, is that of Püllna, which contains 154 grains, or about two and a half drachms, of sulphate of soda to the pint,

and nearly two drachms of sulphate of magnesia.¹ Those quantities of the commercial salts would give a tolerably efficient purge to most persons. But you must not give a pint of these natural waters to any one; five to seven ounces would be a full dose. I do not like Püllna generally for our purpose, because it purges too freely, often gripes, and is very nauseous; Hunyadi Janos is less so. Half or two-thirds of a drachm of sulphate of soda and half a drachm of sulphate of magnesia in a natural mineral water is an average efficient aperient for a man. Supposing that we order Friedrichshall, which

¹ The large demand which has arisen in this country for the 'bitterwassers' or natural aperient waters of Germany has, of course, led to the appearance of new varieties. Thus, more powerful and so called 'richer' products have come into the market. It should be known that the increased proportion of the aperient salt to the water in which it is dissolved is caused by artificially evaporating the product of the spring. Thus a constant quantity of the solids is maintained by carrying evaporation to a fixed point, determined by the specific gravity of the solution. Water having been thus artificially removed, there is no objection to the addition of a considerable quantity of hot water to them when used here, for the purpose of diluting the solution, but chiefly for raising the temperature to at least that of the interior of the body, a condition which appears to render their action more certain and prompt.

The difference in the composition of these waters is not great. Those that contain the largest relative proportion of soda sulphate to magnesia sulphate are, I think, superior for the purposes referred to above.

contains not a drachm of sulphate of soda in a pint, and little more than three-quarters of a drachm of sulphate of magnesia; yet nine or ten ounces make an efficient purge; for many persons six or seven suffice. I think I may say that seven or eight ounces is for the adult an average dose; it should be warmed and diluted by adding, say, a third or a half of its bulk of hot plain water. But I know no difference between this and Hunyadi Janos except that of the latter two thirds of the quantity named is an equivalent dose, and is more convenient in consequence. If then a dose of either be taken in the early morning, an hour before breakfast, which should be a light meal, but comprising the cup or two of hot fluid usually then taken, a full, free action of the bowels will probably follow soon after; perhaps two. That quantity, you see, would contain about twenty-five or thirty grains of sulphate of soda and twenty or twenty-five grains of sulphate of magnesia, which, administered in any combination you please from a druggist's drawer, would have little appreciable action; the patient might be uncomfortable perhaps, but there would rarely be any marked action of the bowels. To repeat what I have said: if you evaporate a quantity of

Friedrichshall or Hunyadi Janos water in a warm water bath so as to avoid decomposition of the salt, and retain the water of crystallisation, thus obtaining as perfect a product as a chemist can produce, and administer three times as much of this salt as that which exists in a dose of the natural water, you will probably not produce such efficient or certain results as the small quantity contained in the natural water ensures. So that there is something, which I do not pretend to explain, and certainly shall not speculate about here, which distinguishes the action of mineral waters from the action of salts which are made by our pharmaceutical processes. I may appropriately remark here also, that the action of the aperient bitter-wasser on some persons is such, that the longer it is taken the smaller is the quantity necessary to attain its object. If, for example, six or seven ounces taken in the morning with, say, four ounces of hot plain water, produce one movement of the bowels immediately after breakfast, the next morning five ounces, and a morning or two later three or four ounces will do the same; and it is not improbable that at the end of ten days or so, three ounces or thereabout will produce the desired effect.

The next water on my list is that of Marienbad, and it contains forty-eight grains of sulphate of soda in the pint, with nine grains of carbonate of soda, no sulphate of magnesia, but a small quantity of iron. With these constituents, there is enough free carbonic acid to make it an agreeable and slightly sparkling draught. Rather more than half a pint produces for most persons an easy motion. If this water is exposed to the air for a day or two, there will be a brown deposit of the iron ; it is indeed to be regarded as a slightly ferruginous water although this character is not an important one. It is a very admirable form for many persons where the action is not required to be considerable ; while the presence of iron, and of carbonate of soda, is an additional advantage for some. The only drawback is the need that it should be obtained in a fresh condition, for it bears transport badly, soon losing its carbonic acid, and depositing its iron, and thus becoming less palatable and light for the stomach. This difficulty has been partially overcome of late by the use of better bottles, and by the increased demand which is gradually arising for it.

Thus much for the saline aperients. We now

come to the water of a very famous spring, that of Carlsbad, which is credited with the possession of a quality or influence, conventionally denoted by a somewhat vague term, 'alterative,' being undoubtedly useful for patients who habitually consume more food than the system and its activity demand, and who manifest as a consequence obvious signs of superabundant uric acid deposit. The patients, however, should be fairly robust; feeble and excitable persons are usually depressed and injured by Carlsbad. There are several sources there, all of which contain about twenty grains of sulphate of soda, and thirteen of carbonate of soda in the pint, and contrary to the common belief are identical in their chemical constituents and proportions. They differ from each other solely in point of temperature, which is very high in the Sprüdel, the central source, and in the remotest is higher than that of the human body. Carlsbad water is often supposed to be purgative, but it is not so unless taken very largely. No quantity ever given here exerts a laxative action on the bowels. The influence it exercises on the animal economy, although probably chiefly due to the sulphate of soda element, is not in any way as an aperient.

The 'Carlsbad Salts' (which are widely and popularly known as an aperient, but are sold at an exorbitant price, bringing a great revenue to the Carlsbad makers) are simply sulphate of soda, or 'Glauber's salts' (with perhaps a trace of carbonate) and differ in no respect, except in name, from that common but valuable aperient as made here at home and in other countries. My belief, after a long and large experience of the employment of Carlsbad water in this country, is that in most instances it is more useful here than when taken at the spring itself. This I will explain presently.

Next to be named is the water of Franzensbad, which contains thirty grains of sulphate of soda, six of carbonate, and a little iron, which Carlsbad does not. That closes this group of springs.

Next I shall just point out the distinctive characters of the alkaline waters which are so popular in this country. First and best known is that of Vichy, which contains only three grains of sulphate of soda, but nearly fifty grains of carbonate of soda, in the pint—a powerful solution. After that is the water of Vals, which is also from the volcanic district of France, some of the springs of which contain upwards of sixty grains of carbonate of soda

in the pint, and nothing else worth mentioning. These two waters are extremely famous, and their sources are much resorted to by patients for the cure of gout and gravel. The waters are also largely exported to other countries. Another alkaline water is that of Evian, on the south shore of the Lake of Geneva, which I name here because it has a certain reputation as a resort for calculous patients. The alkaline constituent, carbonate of soda, is present, however, in much smaller quantity than the preceding, and this spring ranks, as regards the influence of that agent, below the others named.

Contrexéville and its water have of late been more recommended, especially by the profession in Paris, for calculous patients. No doubt some alleviation of symptoms is thus obtained by certain patients ; but the constitution of the water, which depends for its alkaline action chiefly on a salt of lime, renders it an undesirable agent for the object we are now seeking to accomplish.

Under the continued daily use of strong alkaline waters, the uric-acid deposits disappear—that is, they are dissolved by the alkali. Inasmuch, also, as this appears to have some beneficial action

on the liver, a certain degree of benefit is perhaps also attained. Thus such patients are often better for a time after a visit to Vichy ; but, as a rule, are not permanently benefited. I am satisfied, after observation on the spot, and also of the effect of the waters taken here, that they only temporarily mitigate the complaint, and do not cure it. Now, the principle upon which the waters of the sulphate of soda group, aperient and non-aperient, are beneficial is, that they produce activity in all the digestive functions, stimulating the excretory action of the abdominal organs, so that certain waste matters which have been hitherto thrown out as uric acid by the kidney are eliminated in some other form. If therefore it is really desirable to recommend resort to a mineral spring as treatment for uric-acid deposits, I should prefer Carlsbad, and certainly never send a patient to Vichy, Vals, Evian, or Contrexéville. And when a stout active man, whom it is most desirable to separate from his home engagements and business cares, requires a Carlsbad course, he may often visit the locality with advantage. At the same time, as I have already intimated, I firmly believe that it can in the majority of instances be more successfully pur-

sued at home, provided certain concomitant advantages can be secured, than by sending the patient abroad. Thus it is desirable to secure during a course of waters at home, at least regularity of meals, scrupulous attention to diet, and to select a time when, particularly in the case of business men, less of anxiety and of need for overexertion than usual, may be expected. Granted these conditions, there is one advantage in the home course which outweighs much of the special value of a course on the spot. The patient who stays at Carlsbad three weeks, very rarely four, is made to consume far too large a quantity of water in a given space of time. The quantity in itself is probably not too much for his needs; but it is more efficacious, and is less exhausting in its effect on the patient, to devote two or three months to the task than to swallow the whole within the brief term named. It is the apprehension of this fact which has made me so warm an advocate for the systematic home use of these agents, at all events for the class of cases which we are here considering. There are some other maladies for which Carlsbad is recommended, but relative to these it is not my province to offer you any opinion here.

But I shall now endeavour to illustrate with more detail the manner of administering the waters which I have pursued and now advise.

A patient seeks your aid, on account of a series of severe renal attacks occurring at considerable intervals of time, after one or two of which he has passed small pisiform calculi of uric acid. His health may appear to be otherwise good. On the other hand he may be also troubled with some indigestion; in either case he is very likely more or less constipated; and you will probably find that, relatively to his activity of life, his amount of food and stimulant are somewhat excessive. I advise you to give him at the outset half a grain or a grain perhaps of blue pill with three or four grains of the compound extract of colocynth at night, followed next morning by six or eight ounces of Friedrichshall water, or half that quantity of Hunyadi Janos, taken with a little hot plain water. Then, on each succeeding morning, let him take six ounces of Carlsbad, with about two ounces of Hunyadi Janos, and four of hot water daily, say until the end of the first week. If the bowels are not moved at least once easily, soon after breakfast, increase a little the quantity of the

aperient water ; if, on the contrary, there is more than gentle action, diminish the dose. I then usually order four, five, six, or seven ounces of Carlsbad every morning, according to the patient's condition and temperament. If he is delicate, irritable, more distinguished by activity than by force, his occupations demanding intellectual rather than muscular exertion, the smallest amount may amply suffice. If he is a robust countryman, taking much physical exercise in the open air, the largest quantity may be a moderate dose. For two or three weeks or thereabout, the waters may be taken every morning ; after that, every other morning for another month or more, and so on according to circumstances. The Carlsbad should be the chief agent throughout, but since it has no aperient action, with some people appearing rather to induce constipation, and as moreover the presence of the water in the system, for a few hours after taking it, sometimes seems to cause uneasiness and to be injurious rather than the reverse, it is desirable for a large proportion of patients to add a little Hunyadi Janos just enough to induce one gentle action of the bowels after breakfast. The quantity of this must be

decided by each individual according to his own experience of its effects. When the bowels act freely without it, as occasionally happens, the Carlsbad may be taken alone ; and in all cases it should be heated. At the source it is too hot to drink, and is allowed to cool slightly ; and when it is taken here a little hot water may be added, or it should be raised in temperature to 90° or 100° , by placing the tumbler containing it in a vessel of hot water for a few minutes.

I have largely and systematically employed these agents for about five and twenty years, modifying the quantity and the mode as experience has indicated, and the system thus briefly described is the result of it. After a course of six weeks or so, it may be repeated with advantage for many patients, after an interval of three or four months. Meantime, as an occasional aperient and as a corrector of digestion in these cases, few things are better than the aperient waters named. I referred just now to the well-known 'Carlsbad salt' as being often used in the belief that it represents Carlsbad water ; on the contrary, it consists almost entirely of sulphate of soda taken from the water, and has just the same and no more virtue than that

salt when obtained from any other source. But sulphate of soda is one of the most admirable medicines we possess, and deserves to be more popular than it is. I have constantly ordered it, with or without a small addition of sulphate of magnesia, for the out-patients of the hospital, as the best substitute within their reach for the mineral waters in question.

There are many cases, especially those in which the patient has been in the habit of consuming more food, and especially more fatty material, than he has been able to assimilate, for which a few small consecutive doses of blue pill may be most usefully employed. I am quite satisfied in most instances with an eighth of a grain combined with two or three of the compound extract of colocynth, or with four or five grains of compound rhubarb pill, taken every third, fourth or fifth night, during the former part of the course. Many persons in whom doses of two or three grains of blue pill cause painful depression derive manifest benefit from the small quantity named. If anyone whose habits or condition have occasioned beneficial recourse to the remedy doubts the effect of an eighth, a twelfth, or even a twentieth of a grain of blue pill, let him try

the ordinary five-grain compound rhubarb pill, with and without the fractional addition, and the difference will be easily understood and appreciated.

And smaller doses even than these are of great service when habitually taken for a short time by some of these patients who have been the subjects of indigestion. Heavy feeders, large consumers of animal food are little affected by such minute quantities. But when the habit of living largely on cereals, vegetables and fish, with perhaps game and poultry, and little or no meat, has been acquired—which, as we shall soon learn, is a powerful means of checking uric acid deposit, and rendering the individual hitherto affected by it not only free from his local troubles, but stronger and healthier than before—the minuter doses referred to act with ample effect.

Of this system of treating a constitutional tendency to excrete uric acid in abnormal quantity, whether in the form of calculus, or by the less obvious course of gouty attacks in all their varied manifestations, I cannot speak too highly. I know no results in my entire personal experience of practice which have satisfied me more, or have

better earned a right to be considered successful than those which have been thus attained.

But the important subject of the necessary dietary and hygiene for these cases must now be deferred to the next lecture.

LECTURE II.

THE DIETETIC TREATMENT OF PATIENTS EXCRETING
URIC ACID IN EXCESS.

GENTLEMEN,—A growing experience of man and his needs, and especially of that class of our fellow-creatures who on account of some defect of health come under professional observation, has increased my sense of the importance of studying closely the subject of diet and digestion in relation to their ailments whatever they may be. Emphatically a surgeon, I nevertheless find that subject full of interest, and, what is more, believe an acquaintance with it to be the necessary complement of surgical tact and prowess: inasmuch as the right understanding and management of the stomach and its wants, in a sick-room as well as out of it, conduces largely to the success of operative treatment. I request you, therefore, not hastily to conclude that I am quitting

to-day—no, not in the smallest degree—the surgical track which is my department here, but, on the contrary, that I am distinctly and essentially remaining within it. Hence it is that for the first time I take the course of extending the remarks on diet which formerly occupied but the latter third of a preceding lecture, for the purpose of expounding my views thereon more fully than heretofore.

You will recollect that in considering the early history of calculus, I suggested to you a point of view from which the patient excreting uric acid in excess might be regarded, and at all events successfully treated, chiefly through the influence of certain natural mineral waters containing sulphates of soda and magnesia, which act primarily on the organs of digestion. And it is therefore only natural to suppose that the right regulation of the diet of these patients must accompany the medicinal treatment. Indeed I am quite satisfied that in nineteen cases out of twenty, probably in a larger proportion than that, an undue deposit of uric acid will disappear under a proper dietary. At all events, the formation of it in calculous masses can be prevented, and the patient spared the pains and the anxiety connected with their production and

appearance. I think as much may be said of oxalate of lime deposits.

It was formerly held that when a patient excreted uric acid superabundantly, that the obvious and chief course is to diminish considerably the nitrogenous elements of his food, since uric acid contains a large proportion of nitrogen. But this very simple view of the matter will not furnish the secret of successful treatment, as the endeavour to realise it in practice has long ago demonstrated for myself, and a like conviction must also have arrived to others. For many years past I have pursued a widely different course, and with results which warrant the statement just made.

Speaking then in general terms, the two classes of food which it is necessary to eliminate from the dietary of those who have been excreting uric or oxalic acid abundantly, but especially the former, are, fatty matters, and saccharine products of all kinds: the former not entirely, the latter as completely as possible. Next, alcoholic drinks should be forbidden, or, if permitted in some exceptional cases, should be taken only in very small quantity. Let us get rid of this subject first before proceeding to that of food properly so called. There is no doubt

whatever, that the great majority of these patients are better without fermented or spirituous liquor in any form. Its habitual use for healthy persons is undesirable and injurious as a rule, to which there may possibly be a few exceptions in this world of infinitely varying conditions. And for patients with impaired digestive power it is usually still less desirable. For those who have the symptoms before described as depending upon a 'torpid liver,' alcoholic drink of any kind is, I believe, invariably pernicious; its daily use in very small quantity creates the condition so termed for thousands, and is the cause of an infinite number of chronic cases of obstinately recurring, although slight, 'sick headaches,' 'bilious attacks,' as well as much of the malaise, and incompetence mental and bodily, attributed to a slow digestion.

But after long indulgence even in a small quantity of alcoholic stimulant, many a patient misses it exceedingly, and when commencing a habit of abstaining rises from a meal, however ample, complete and varied in the matter of provision, with a sense of dissatisfaction only to be appeased by that little modicum of liquor which has been absent. Of course this is the expression

of a want artificially created, and it is very hard to stifle that craving. It will make itself felt for months perhaps—I speak of exceptional cases—and explains many of those in which an individual tells you, ‘I tried total abstinence for six weeks, or two months, and found I could not stand it.’ I will even concede that for a time he may have digested less easily and profited less by his food than he did when he took the stimulant; but this condition you may assure him will continue only for a time. Perseverance in abstinence, with a rarely permitted recourse to relief in unusual circumstances, will be rewarded in the course of a few months. Three, four, or even six, may pass before the digestive functions will regain their normal power apart from the artificial stimulus, and then they work better than before; and thus the patient reaps, if he faint not, the reward of his well-doing. When you admit some compromise in the matter, generally advise a sound light wine, the ordinary produce of the Moselle if possible; in its absence, that of the Rhine, or (now more difficult than formerly to obtain pure of common table quality) Bordeaux. But certainly forbid most champagnes and other effervescing wines, as for the most part imperfectly

constituted, and always bad if containing much of the sweet compound often largely added and known as 'liqueur.' The stronger wines, as sherry and port, are always unsuitable, and strong beer is to be absolutely forbidden. Very light bitter beer, or sound cider which is neither sweet nor acid, is preferable to any of these if any alcoholic stimulant is to be taken. They might be so made in this country as to be at all events as wholesome as any wine wherever it comes from. It is a pity we do not produce here a very light alcoholic beverage from malt and hops which might be less injurious, and infinitely cheaper than any compound which is imported from abroad. While the apple, and possibly other fruits, with increased skill in the making would offer agreeable variety. All such products should be perfectly dry, that is, containing no free saccharine. Solutions of pure spirit and water may perhaps be permitted by exception for a very few of those who really require such stimulus.

But it is in the matter of food that there can be no compromise if it is intended to arrest the progress of calculous formation when it has once commenced. I have but one preliminary observation to make, always essential to be considered before

defining strictly a dietary for any person. It is this : that when proposing to lay down a plan of this kind, whatever the object in view, the prescriber must ascertain the patient's habits, and especially what amount of bodily activity is habitually enjoyed, or demanded by the daily occupations of his life. It should be unnecessary to tell you, that where severe or prolonged muscular exertion must be sustained, in laborious occupation or in the pursuit of sport, more hydro-carbons and a little more nitrogenous food are desirable than for the sedentary man whose time is chiefly spent at the desk, in the office, in the courts, in the studio, in the carriage, and who has, moreover, but little opportunity for exercise. Make yourself acquainted with all his habitual modes of expenditure in the matter of physical energy, before furnishing detailed instructions as to the food which is to support it.

And not less is the age of the patient a matter of considerable importance. Let me insist on the truth of a doctrine which ought to be more familiarly known and acted upon than it is, viz. that all who have reached an age at which capacity for active exertion is diminished, should maintain a similar abstinence from such food, in order to

ensure a continuance of health and comfort. There is no more common, and perhaps no more flagrant popular error than that which is responsible for the practice of constantly 'supporting,' as it is termed, those who manifest the debility of age by augmenting their supply of food. It should be remembered, that all excess of nutriment over the power to assimilate, and also to employ in healthy activity when assimilated, must inevitably overtax the excretory powers, and become a source at least of discomfort, if not of disease. In short, when sedentary or generally inactive habits are induced, whatever the cause, whether through debility, accident, or age, highly nutritious diet, and especially a large proportion of hydro-carbons, is almost invariably prejudicial. This being premised as a general principle, I shall add that, for the calculous patient in particular, it is essential to enforce a very sparing use of fatty matters in food. If he is already stout, weighing some ten to twenty-five pounds, as often happens, more than the average attained by healthy men of active habits, the abstinence should be strict; and the gradual reduction of his weight ensured thereby will, within certain wide limits, denote the measure of his

improvement in relation to his calculous tendency. In order to ensure a steady but gradual diminution of bulk, the patient should always be weighed by his adviser, and the amount registered for comparison week by week, that the effects of the change in diet may be accurately observed. A loss of four or five pounds during the first month will almost invariably be attended by a sense of increased power, of agreeable disposition to activity, in the place of pre-existing torpor, lassitude, and oppression. During the second month the diminution will be less; in the third less still, by the end of which time another three or four pounds or so will be taken from the heavy burdens which have afflicted the corpulent patient. When this condition is not present, a less rigid regulation in relation to fatty matters is necessary; although in all such cases they must be permitted in very moderate quantity.

What are the ordinary foods in daily use which largely contain the objectionable elements, and must therefore be more or less avoided? Milk, cream, butter, cheese, eggs (especially in the form of omelette), creams and pastry; fat pork in its many forms; suet in puddings and pastes, the fat of roast

and boiled meats, &c. The homely rice or sago pudding, chiefly compounded of milk and egg with sugar, so excellent for our children, and for healthy active people—type of simplicity; I might almost say, of the domestic virtues—is in the last degree objectionable for your uric-acid-making, gouty patient. Nevertheless, all the farinaceæ may be used so as to furnish desirable dishes in the nature of puddings, if made savoury, not sweet, with light broths instead of milk, using eggs in moderation, some condiment (a pinch of curry, or a few morsels of chutney) instead of sugar. Then next all articles of food, whether natural products or artificially combined, which contain sugar, particularly cane-sugar, must be expunged absolutely from the list of aliments permitted. I do not enlarge further here on the principle on which this advice is given. There is much to be said thereon, but this is neither the time nor the place for discussing the subject at great length. Suffice it to add that abstinence from the substances named probably lightens considerably the work of the liver, and so lessens manifold vicarious forms of activity on the part of the kidneys in accordance with the views already propounded. Let me just advert, however,

to the dietetic system in force at Carlsbad in relation to the patients in question. Apparently in recognition of the principle explained above, the use of sugar and of butter is absolutely forbidden during a Carlsbad course; and were one of you a patient there, your purveyor would not supply you with the forbidden food, however much you might demand it. I can only say, as the result of observation, that this system, far more than that of eliminating meat from the dietary, will reduce the uric-acid deposit. By forbidding everything that contains sugar, and diminishing considerably all fatty matter—permitting nitrogenous food in fact, although only in moderate quantity, and diminishing greatly hydro-carbons—you will generally accomplish more than by the contrary method.

What then is the dietary to consist of? Fish in all its forms, except those which contain much fatty matter, as herrings, mackerel, eels, and the under part of the salmon. Game in all its forms and poultry; lean meat in moderate quantity, besides preparations of gelatine, often welcome and useful as savoury jelly as well as that which is otherwise agreeably flavoured or acidulated, but

unsweetened. Butter in moderation is the only direct form of fat, some being necessary, which I am in the habit of permitting, as well as an egg or two without which cookery is impossible, objection relating solely to the yolk or fatty part, and milk in strict moderation. Well-made bread, especially that which contains every portion of the wheat grain, outer envelope or husk included; oatmeal, pearl barley, macaroni, and the Italian pastes; all can be easily presented in numerous simple yet palatable modes, by the exercise of very little culinary intelligence, and ought to occupy a large place in the daily service of food.

In relation to whole-meal bread for daily regular use, let me pause an instant to remark that the value of inert matter as an essential part of our food seems to be quite lost sight of in the search for 'nutritious and supporting' elements, unmixed if possible with any other. Even so-called 'bread reformers' vaunt as an improvement their elaborate processes of ridding wheatmeal of every particle of what they are pleased to regard as useless matter. Few people appear to know that most of the habitual constipation, so generally complained of, is due solely to the fact that modern civilisation

demands the elimination of everything that is not nutritious from our food, the consequence being that there is very little inert substance left after digestion to produce a faecal mass for the muscular intestine to grasp and transmit. The cereals and green vegetables, when employed in their nearly natural conditions, furnish for this very useful purpose a quantity of inert material, which a well-meant but blundering interference officiously removes. It is quite remarkable to what a large extent this important element of food is ignored, even by professed authorities on diet, unless its value be not, which is more probably true, wholly unknown and unsuspected by them. I may add that the whole-meal bread, which is on this account so valuable, may be improved, both in flavour and texture, by an admixture of fine, not coarse, Scotch oatmeal, in the proportion of one-fourth or one-third to the wheat-meal employed.

Another class of vegetable products of great importance on the ground of the nutritious elements, especially nitrogenous, which they contain, is presented by dried haricots in all their varieties and lentils. These are capable of furnishing excellent dishes, often preferred to joints of beef and

mutton, which they may sometimes advantageously replace. They may also enter into the composition of soups in the form of purée, valuable for the ease with which they are usually digested and the amount of nutriment contained, especially to those whose occupation is active and demands physical exertion.

The less nutritious class, the farinaceæ, as rice, sago, tapioca, arrowroot, &c. are all useful treated in the manner above incidentally referred to, that is, as savoury dishes and not as sweets. Fresh green vegetables are especially to be recommended, and are worth bestowing some pains on, to obtain good and cook well, when they may form an important item of the list. The fresh legumes, such as green peas, young broad beans, &c., are valuable for most people, although a few do not digest them easily, especially if time is not given to mastication and insalivation (absolutely essential, not only for digestion, but to secure all their nutritious elements), however tender the vegetable product may be. Some persons can digest a light salad; others can eat no vegetable until it has been cooked; and no rule can be made applicable in all cases respecting it. Celery and seakale, asparagus

and tomatoes, the potato and the artichoke, are important items on our list to which I know of no objection, although the potato has been often, as I think unnecessarily, excluded from it. Apples may generally be permitted, best when roasted or baked, without added sugar ; but rhubarb, strawberries, raspberries, gooseberries and currants, grapes, plums, pears, and all sweet fruit, native or foreign, must be rejected without hesitation, whether fresh or preserved. For those persons who feel the loss of sugar in diet, as that of a luxury highly prized, and there are many who do so, no objection can be made to the use of the recently discovered product 'saccharin.' It exerts no action in the body akin to that of cane and grape sugars, and appears to be quite harmless in every respect.

Milk, already referred to, is very undesirable as an article of diet, both on account of the large proportion of fat and sugar it contains ; while its nitrogenous principle, casein, is by no means a universally digestible element. At the same time a small quantity, to be taken with tea, coffee, or cocoa, not in the proportion usually adopted for 'café au lait,' may be taken without hesitation

of course. In large quantity it is not only noxious, but is often digested with great difficulty by the class of patients now under consideration. Thoroughly skimmed it is less objectionable, although the remaining elements render caution in the matter of quantity still desirable. In the same way, there is no objection to the use of the white of egg, so valuable in cookery: the yolk being, from the large proportion of its oily constituent, the part which should be eliminated or employed with great moderation.

Here, I think, is a range for choice by no means to be complained of, at all events for a class of patients whose dietary must, in some important particulars, be strictly curtailed. Modifications can and should be made by minimising or augmenting the relative proportion of animal and vegetable elements according to the engagements, surroundings, or idiosyncrasies of the individual.

I next remind you after this brief, but still sufficient sketch of the principles of the dietary, that other points of hygiene must be attended to, when conformity to the first and chief has been ensured. Thus it is essential to stipulate for a certain amount of muscular exercise, some to be

taken in the fresh air daily. Quite as important is attention to the healthy action of the skin, encouraging this by a habit of simple daily bathing in the bedroom, following it by friction of the surface of the body in some efficient manner.

But the first-named object as well as the second may to some extent be accomplished by the same process, and by no better mode than by the systematic use of the flesh brush. I have long recommended for this purpose a brush specially made with rather soft bristles of unequal lengths, so as not to present an even flatly cut surface, which latter effects the object imperfectly. The soft uneven bristles gently penetrate between folds and flexures, or follow the varied contours of the body, without irritating, much less abrading the skin. A pair of these, each with its strap passing over either hand of the user, systematically applied for five or ten minutes every morning, afford a capital form of exercise for those who have little opportunity of obtaining it sufficiently out of doors, and so for the middle-aged and elderly man offer an equivalent to the club or dumb-bell performance of the young and hearty.

At this period of life the capillary circulation

of the skin mostly becomes languid and deficient, if not stimulated or provided for by some special means. Hence it is that unnatural dryness of the skin, harshness, chronic eruption, coldness or partial insensibility of the surface are so often experienced by elderly people. By daily gentle applications of the soft brush, circulation of the blood in the superficial capillaries is produced, and a skin which has long been dry, rough, and inactive may in a few weeks be rendered soft, supple, and vascular, like that of a healthy person in middle life. Better still, such a skin performs its functions and takes its share of work among the other eliminating organs of the body.

It should not be forgotten that with the diet described, some increase of clothing is usually necessary. There is no doubt that thicker coverings in spring and winter are felt to be necessary now, than when food more rich in fat was freely consumed. On the other hand it is a marked and agreeable experience for many, that the oppressive heat and the plague of thirst which so many complain of in hot summer weather are unknown to the consumer of diet which is chiefly cereal and vegetable, with some fish and a little fruit. These

matters are here named, being of essential importance, from their necessary and close relation to the subject of food and its functions.

Such then is an outline of the system embracing a regulated diet, regimen, and the use of natural mineral waters, which I have so long and so satisfactorily employed, and which I strongly advise you to pursue for the purpose of checking calculous disease in its early stages, and so preventing the formation of stone in the bladder in that considerable majority of cases which are occasioned by an undue formation of uric acid. I shall only add that I invariably advise it in a more or less modified form, but the dietary invariably, for all patients for whom I have once operated on for an acid calculus, in the hope of preventing the recurrence of any further product in the future. Nothing is more probable in a robust man of middle age who has once furnished such a product than the appearance of others in course of time. And you may wisely tell him this ; but you may confidently add that if he will follow your directions, implicitly and not half-heartedly, you can very nearly promise him a future immunity from stone as the consequence.

LECTURE III.

ON THE TREATMENT OF STONE IN THE BLADDER
BY SOLVENTS : ITS HISTORY AND PRACTICE.

GENTLEMEN,—The inquiry as to whether it be possible by the use of medicinal or chemical agents to dissolve stone in the bladder, and so to avoid any operative proceeding for its removal, is one which has excited a great amount of interest at different epochs of our history. During many centuries this question has appeared and reappeared. Some accident calls public attention to it; interest is aroused, experimental trials of some new agent, which probably proves to be an old one in modern guise, are made, achieving little or no success; after which a cycle of indifference follows. Meantime, as the sum of these reiterated efforts, some sort of progress results. Nevertheless the subject is scarcely considered in standard surgical works,

although it is one fraught with interest to us all. For myself, I confess, it has always had a degree of fascination. It would be so great a triumph to our art to dissolve the stone without damage to the delicate structures in which it arises and finds its residence. And thus it is that I have not only alluded to it in various works, but have discussed it at considerable length many years ago in one of them.

I propose therefore to tell you what has been done, and what at present, indeed, how little, appears to be attainable by the agents employed; endeavouring to sketch the history of solvents for stone in the bladder from the earliest period to the present day.

You know that the existence of calculus was recognised, and that a cutting operation for its removal, at all events in the cases of boys, was practised, a few centuries before the Christian era. In course of time the attempt was made to dissolve it, especially in the case of adults. It appears that neither Hippocrates nor Galen entertained the belief that this was possible. One of the earliest allusions to the practice is found in Pliny, who says that 'the ashes of burned snails' shells are

good for expelling the stone.' Aretæus, in the second century of our era, recommends 'quicklime in hōneyed water' for the same purpose. Later authors, quoted by Paulus Ægineta (seventh century), speak confidently of the efficacy of goat's blood, and they observe that certain solvent remedies if administered to inappropriate cases may increase the size of the calculus.

Arriving at the period when medicine flourished in Arabia, we find numerous specifics and some extraordinary combinations of them systematically given. The celebrated Avicenna (about the tenth century) enumerates many substances supposed to be efficacious. He and others of his time employed occasionally an impure carbonate of potash; but as an example of the kind of prescription current at this period, I give you one of them in full, translated from Avicenna, as it is a curiosity, and gives you a good idea of the very complicated mixture which sometimes constituted an ancient medicine: 'Take equal parts of calcined glass, of the ashes of scorpions, of the ashes of the root of colewort, of the ashes of a hare, of the ashes of egg-shells from which the chickens have escaped, of the stones found in the sponge, of goat's blood dried and powdered, of

lapidis judaici, the same of parsley, wild carrots, marshmallow seeds, and gum arabic. Make it into an electuary with honey.'¹

Between this period and the fifteenth century we can mark no advance. About this time Basilius recommended the internal use of an alkaline salt, obtained from the cuttings of the vine in spring; this rests on the authority of Boerhaave.² Crollius, in his '*Basilica Chymica*' (Frankfort, 1608), recommended the patient to take a salt of tartar (carbonate of potash) in an infusion of parsley, and also some solutions of which lime was the principal ingredient. In 1650 Daniel Sennertus directs the internal use of the same remedies, and also that they should be injected into the bladder through a catheter. About the same time, Riverius, physician to the French Court, advises, as many others also did, the ashes of calcined egg-shells. The dose was a drachm of the powder, which was, of course, chiefly lime, to be given in white wine or with diluents twice a day; and it is stated that '*potenter expellit calculum in urinæ meatibus hærentem.*'³ Numerous

¹ Avicenna, lib. iii. fen. xviii. trac. i. c. xix.

² *Elem. Chimiæ*, 1732, ii. 73.

³ Riverius, *Praxis Medica*, Lugd. 1657, p. 381.

other authorities might be quoted as repeating all these receipts with little or no variation.

Next in order comes, in this country, the famous Mrs. Joanna Stephens. This lady had acquired so great a reputation in the earlier part of the last century, that in 1739 the English Parliament, after a formal inquiry, purchased her secret for dissolving the stone at the cost of 5,000*l.*—a circumstance which produced a large and remarkable literature during the next few years, and gave a great stimulus to research. The document which was obtained at this cost commences thus:—

‘ My medicines are a powder, a decoction, and pills. The powder consists of egg-shells and snails, both calcined. The decoction is made by boiling some herbs (together with a ball which consists of soap, swine’s cresses burnt to blackness, and honey) in water. The pills consist of snails calcined, wild carrot seeds, burdock seeds, ashen keyes, hips and hawes, all burnt to blackness, soap, and honey.’ ¹

The quantity given was a drachm of the powder three times a day, mixed in cider or other liquor,

¹ *Gentleman's Magazine*, June 1739, ix. 298.

and followed by half a pint of the decoction. If the decoction disagreed with the stomach, the pills were to be substituted. These compounds were found to be very nauseous, and were soon superseded by other agents.

After this, Dr. Whytt, Professor of Medicine in the University of Edinburgh (1761), brought soap and lime-water into favour, giving one ounce of 'Alicant soap' and three pints of lime-water daily, and illustrating its use by a remarkable case or two.

In the practice of Blackrie (1766), Chittick (who made all his patients send locked cans of veal broth daily to his house that he might add the solvent and preserve his secret), and others, mixed solutions of potash and lime were much employed; and a considerable amount of evidence of their utility to allay pain was published on good authority. Soap leys of different strengths furnished the potash in many cases; in others the 'salt' of tartar was given, and always in a very diluted form.

In France at an early date alkaline remedies had many advocates, such as Darcet (1726)¹ and Pierre Desault (1736). Morand, the famous

¹ *Annales de Chimie*. Paris.

surgeon of Paris, who came to London to report to the French Academy on Cheselden's operation of lithotomy, made also very careful observations on forty patients treated by Mrs. Stephens's remedies. He was unable to certify to a single case of removal by the solvent, but said that four 'thought themselves cured.' Much later, the subject of alkaline solvents was investigated by Fourcroy and Vauquelin; more recently by C. Petit (1834). The first and last named employed the Vichy waters. In Italy, Girardi (1764) recommended the use of solvents, but extolled especially the virtues of a decoction of *uva ursi* for that purpose.

Meantime the vegetable kingdom had been largely explored for the same purpose. It will suffice to give a list of a few of the principal plants so employed during the last two or three centuries. I shall name those only which enjoyed the greatest favour. The 'Banke cress,' or 'saxifrage' (the name being due to its reputed virtue): its seeds boiled in decoction of couch grass; dose of the seeds, one drachm. Tincture of the '*Pimpinella saxifraga*.' A tincture of the seeds of the '*Lithospermum majus*,' or 'great gromell.' The decoction of 'Broome;' a tincture of the seeds of '*Fraxinella*.'

Tincture of the root of the 'Raphanus sativus,' or garden radish. Tincture of the seeds of the common nettle. The marsh and yellow mallows, the couch grass, parsley, and the wild carrot were also ingredients in the compound decoctions employed.

And now I come to the experience of to-day. And I suppose you to inquire, 'What are the existing resources available for a patient who desires at the present time to attempt the solution of a stone in his bladder ?

I shall divide these into two classes. First, there are the empirical remedies, which have a certain reputation; and secondly, there is the result of the latest investigation of the subject by scientific observers.

First, the empirical remedies. It is a curious fact that in almost every European country there exist certain persons who obtain a livelihood by making and selling remedies to dissolve the stone. The recipes employed are usually family heirlooms, and a sort of reputation clings to the family, each generation of which carefully preserves the secret, such as it is, and the traditions of their predecessors. In the same way what is called the art of bone-setting, as you no doubt know, is asso-

ciated with certain names and localities ; known chiefly in provincial districts, where also flourish the makers of the nostrums now in question. The liquid solvents—for they usually take that form—are sold in this country under the name of ‘constitution water,’ or some similar term ; and as a matter of course they are also guaranteed to be useful in all forms of urinary disease.

Peculiar circumstances have given me large opportunities of observing and examining these agents. I have met with them here and in different parts of France. I well remember an old Frenchwoman and her son journeying on foot from the South of France to Brussels, many years ago, laden with a basket of heavy bottles filled with the family nostrum for presentation to a royal patient there.¹ I may add that her devotion was substantially rewarded. Such unsolicited contributions—either material, as in this case, or by way of suggestion of every conceivable kind—flowed in then from every part of Europe ; and such is always the case in similar circumstances.

Let me say that it has been my lot to re-

¹ The first King Leopold of Belgium, who suffered severely from calculus, and whose case excited much interest at the time.

ceive numerous communications on this subject from known and unknown correspondents, urging on me the value of the recipes which belong to the writers. I shall select two examples, which widely differ, for mention here, each possessing interest of its own kind. One was from a French gentleman, who gives me his name, and offers an infallible cure for the stone, which of course he does not describe, but consents to communicate it for the moderate sum of a million of francs (40,000*l.* sterling); and I do not hesitate to say it would be well worth the cost if it could accomplish the wonderful results alleged to be within its power. The other communication was sent me by an English labourer in Bedfordshire, who wishes me to know what cured his friend some time ago in the neighbouring parish. He freely presents me with the formula, and it is a fair specimen of a good country recipe for the purpose—for I have seen many such—and it has some interest for us, as we shall find hereafter. I could not help writing my thanks to this man in reply, and was at some trouble to explain why his remedy might be good in some cases, and why it might be prejudicial in others. Here it is in his own words: ‘Get a peck of wood-ashes, and

pour on them a gallon of boiling water ; let it stand twenty-four hours : then strain it off as clear as possible, and take a wineglassful every morning, fasting.' This is a large dose of carbonate of potash : our old friend, the alkali, you see, always recurring. I had the curiosity to determine the quantity. A ley of wood-ashes thus made from pine-wood furnishes a solution of fifty grains of the carbonate to the ounce, so that the quantity taken at once was at least a drachm and a half or two drachms. The other soluble constituents of the ley are sulphate and silicate of potash and chloride of potassium.

Now, as to the more pretentious compounds which are sold in this country as solvents, I have submitted the chief to careful chemical analysis, and I intend to present you with the result. Not that I had any doubt as to what their general characters and composition were, nor of the fact that they were all nearly alike in their composition. But I wish you to have an exact statement founded on analysis. A recent examination of a well-known and typical one sold as 'constitution water,' and in some repute in this country, shows it to consist of a simple undisguised solution of bicarbonate of

potash in water. Two bottles are placed before you, and are at your service for analysis if you like to make it. You see that they are ordinary wine-bottles, the old 'wine-quart;' each contains about an ounce of bicarbonate of potash and fifteen grains of chloride of sodium—with a few sulphates in minute quantity, possibly due to the spring water of which evidently the solution is made. Half the bottle, which is equivalent to four drachms, is directed to be taken daily. The price at which this 'constitution water' is sold is three shillings and sixpence the bottle!

And here let us make a rapid survey of the long and curious history of man's painful, slow, and somewhat clumsy efforts to rid himself by medicine of his terrible enemy the stone. Observe that the agents have always been alkaline. At first, and chiefly, the alkaline earth, lime: you mark it as the agent in the calcined snail-shells of Pliny and the egg-shells of Avicenna, which do but reappear in that expensive prescription of Mrs. Stephens in 1739; but in Avicenna's time it was combined with potash, the representative alkali of the vegetable kingdom, as you see in the quantity of burned plants which enter into the composition;

and Mrs. Stephiens, probably without knowing it, employed potash and soda also, by means of the very important addition of soap, calcined weeds and seeds to the egg-shells. After this lime-water and soap came into fashion, giving another combination of the three alkaline agents named. And the popular remedy of to-day before you, sold at so high a price to the purchaser, and of which a large quantity is ordered to be taken daily for three months, as the minimum dose and time, is, as you have just seen, a simple solution of bicarbonate of potash in water; and the cost of it to the seller is actually less than that of the bottle and the cork which enclose it! Our country labourer's nostrum is nearly if not quite as good in form, has precisely the same solvent power, and is almost absolutely without cost.

Then the alkali again appears in a group of natural mineral springs, of which a somewhat popular remedy—namely, Vichy water—is the type. These have been and still are largely employed by patients with urinary maladies, and have been vaunted for their solvent powers on the ground that they consist mainly of a strong solution of carbonate of soda, the alkali of the mineral kingdom, as potash is of the vegetable.

We are now in a position to arrive at the following conclusion, the only one possible—viz. that all the empirical and would-be secret medicines employed from time immemorial to the present day are solutions of either lime, soda, or potash, alone or combined. All the plants, after combustion, furnish alike only one and the same active agent—viz. potash; all shells, whether of eggs or of marine and land animals, furnish alike only one and the same active agent—viz. lime.

Lastly, the medicinal remedies employed by the faculty everywhere, at the present day, are hydrate of potash, in the form of liquor potassæ, the bicarbonate, the citrate, the acetate, and the tartrate of potash. After them, and less generally employed, are soda and lithia in different forms.

Now, before entering on any consideration of the applicability of all these agents as solvents, from a scientific and not from an empirical point of view, it is necessary to examine briefly the substances they are destined to act upon—namely, the stones in the kidney or the bladder which it is desired to dissolve. And the first fact that must strike you at the outset is, that these calculi are of different kinds; some having characters diametri-

ally opposite to those of another kind. And the question naturally arises, Is it possible that one form of remedy—namely, the alkaline agent—can be adapted to dissolve calculi whose composition is so varied?

I shall remind you of those general terms which I used in a recent lecture on that subject to classify the varieties of urinary calculi. Three-fifths of all the calculi met with among adults of all ages are composed of uric acid and the urates; nearly two-fifths are chiefly phosphatic, many of which are 'mixed'—that is, contain at least two different constituents; and about 3 or 4 per cent. are oxalate of lime. Cystine is too rare to be admitted to our reckoning. Three-fifths at least, then, are the products of a urine abounding in acid, of which excess they are the expression. The remaining two-fifths are the product of urine generally alkaline, mostly ammoniacal, of which condition they are the result. The urates, the oxalates, and a very few of the phosphates, are formed in the kidney, and are the product of certain constitutional derangements; the greater part of the phosphatic material, whether in mixed or in phosphatic stones, is produced solely in the bladder, and is the pro-

duct, not of a constitutional state, but of local disease there. Now, uric acid we know, by experiments conducted out of the body, to be soluble in alkaline solutions, but some of these have a more energetic solvent action than others; and the resulting salts vary in solubility. Thus, urate of lime is a rather soluble salt. Urate of soda is less so, and in this form enters into the composition of some calculi. Urate of potash is more soluble than either of them. Potash, the alkali of the vegetable kingdom, appears to be the most powerful solvent (although lithia may be nearly equal) that can be employed on a uric-acid calculus, among those materials which are capable of being taken internally for a long period of time with comparative impunity. These facts, then, indicate it as the most desirable agent to employ under certain conditions, hereafter to be described, and as such it has long been regarded. More than thirty years ago I called attention to its pre-eminence for this purpose, stating that the 'citrates and carbonates of potash are more potent and certain than Vichy water' for the treatment of 'uric acid in the form of gravel,' and that they should be given largely diluted, pure water itself being one of the best

solvents.¹ I may add, that I have always declined to prescribe Vichy water for any urinary affection, and on the ground of its inferiority to the potash solutions. I think the citrate of potash may be fairly said to be the salt which of all others offers the best chance of success: and this is now the opinion of all who have examined the subject. If, however, it exerts too much diuretic action, as in some cases it seems to do, the next best may be employed—namely, the bicarbonate, or the liquor potassæ.

A question of great interest comes before us here. Has citrate of potash been fairly tried on stone in the bladder by a competent observer? I am happy in being able to answer this question in the affirmative. A well-known and accomplished physician, Sir William Roberts, of Manchester, formerly a distinguished pupil of this school, has made carefully conducted experiments on calculi in and out of the bladder with certain results. I give you the following brief analysis of them.

Sir William Roberts finds carbonate of potash to be the most powerful solvent: better than soda, much better than lithia. The solution must not

¹ *The Lancet*, 1854, i. 439.

be too strong, otherwise an alkaline biurate coats the calculus and solution is checked. The best salts to administer by mouth are the citrate and the acetate, these, as you know, becoming carbonates in the urine. The adult dose should be forty or fifty grains in three or four ounces of water every three hours—equalling six drachms daily. The urine thus rendered alkaline may become cloudy from amorphous phosphates, but this state does not hinder solution, provided the urine is not also ammoniacal; but if it becomes so, it is most important to bear in mind that all solvent action then absolutely ceases. Hence it is useless to attempt the solution of a uric-acid stone unless the urine is naturally acid. If the urine is alkaline before commencement it is certainly ammoniacal, and no solvent will act, as mixed phosphates are deposited on the surface of the stone. He admits that it is quite useless to attempt the solution of a large calculus of any kind, or of an oxalate of lime calculus; and that nothing can be done with a phosphatic calculus except by the process of injecting into the bladder. Lastly, he states, alkaline injections of the bladder for uric-acid calculus are without efficacy. To resume: the following condi-

tions are essential to success: certainty that the stone is of uric acid, and that it is of small size; that the urine is acid, and never ammoniacal. These extremely favourable conditions existing, the most powerful solvent known—potash—offers a fair chance of diminishing its volume considerably after a trial of several weeks, so that the nucleus may perhaps be passed by the urethra; but at present Sir William Roberts is not able to report so complete a success.¹

There, that is the best thing that modern science has yet done towards accomplishing the dissolution of the stone. Then you say, Have there been no results whatever from the empirical methods you have described? Have miserable calculous patients for two thousand years been swallowing to no purpose all the nauseous mixtures described, from the time of Pliny to Joanna Stephens, and onwards through Chittick, with his locked cans, to the nostrum dealers of our own time? I wish to give you a fair and distinct answer to that question, and will do so as far as it is in my power.

I reply, first, that no trustworthy evidence has yet been produced, that the complete solution of

¹ *Practical Treatise on Urinary and Renal Diseases*, 4th ed., 1885.

a stone in the bladder has been effected by any alkaline agent whatever. I cannot find that any patient, certified to have stone after sounding by a competent surgeon, has, after a course of any solvent, been again sounded, or submitted to autopsy, and demonstrated to be free from stone. Less evidence than this is valueless. That the alkaline solutions often greatly palliate severe symptoms in some cases and enable some patients, but by no means all, to continue in comparative comfort for a considerable time without extraction by any method, I have long been perfectly satisfied. I have seen a remarkable example or two of their influence among those aged and very infirm persons whom it would be very dangerous to submit at any rate to lateral lithotomy, and whose calculi are not within the limits of lithotripsy. Such have sometimes been enabled to spend the remainder of their lives with little or no suffering, provided that they were also enabled to maintain a condition of repose and freedom from movement. More commonly, however, the freedom from pain which alkaline agents produce is temporary only; and in some cases the effect of them is to produce considerable aggravation of the

symptoms. This was often observed during the 'soap and lime-water' period. But it is not the question now to estimate what degree of palliative influence is exerted by alkalies, but whether they can effect a complete solution of the stone. Morand's cases, already referred to, of which twenty-two were sounded before taking the medicine, did not supply a single proved example of success. Among the alleged triumphs of the lime and potash treatment, many patients were examined after death and found to have stones, often numerous and large, still in the bladder.¹ But what is more to the point is, that the four persons who were examined by the trustees appointed by the Government to determine the merits of Mrs. Stephens's remedies, and certified to be cured, died, each one of them with stone in the bladder, where it was found by post-mortem examination!²

The case of Horace Walpole in the last century

¹ Dr. James Parsons reports twelve post-mortems of Mrs. Stephens's patients, who, dying, were found in that condition. *A Description*, &c. London, 1742.

² Alston's *Lectures on the Materia Medica*, i. 268. London, 1773. The names of these patients were Gardiner, Appleton, Norris, and Brighty.

is well known ; it was written by himself for the Royal Society. He commenced—being nearly seventy years of age—to take from half an ounce to an ounce of Alicant soap and three pints of lime-water daily for many months at a time, and with short intervals, up to the period of his death at seventy-eight. He experienced great relief after taking them for a year or so, and ultimately believed himself to be cured. At his death three smallish calculi were found in his bladder. The case naturally attracted much interest at the time, and is one of the most carefully observed on record.

But there is another curious fact in connection with this matter, namely, that the great majority of the patients who took these medicines then, and of those who take such now, are not the subjects of stone at all. They have painful symptoms which they are pleased to consider evidence of stone in the bladder, and they take large doses of alkali—notoriously one of the best remedies for painful micturition from any cause—and obtain relief. They then tell their neighbours, and often certify in print, that they ‘have been cured of that dangerous malady the stone.’ These are the great

cures which the nostrum-mongers rely upon. For what happens to those few of their clients who really have stone? Two things may happen: first, the stone, if uric-acid, becomes coated, as Sir William Roberts describes, with the biurate, which either adheres or comes away in scales; or, secondly, the urine will become ammoniacal; and thus in either case no dissolution whatever can occur. During the time, however, large quantities of white sediment composed of the earthy phosphates or even of shell-like fragments of the biurate, to say nothing of the white granular deposit of the mixed phosphates, come away; all which the poor patient is led to believe to be the débris of his stone and the proof of the efficacy of the solvent process! This fact exists in the great majority of cases, and is always relied upon by the nostrum vendor as an infallible sign of the value of the agent! Meantime the stone is acquiring, not slowly, fresh layers of deposit, and is becoming almost certainly larger. Such must often be the inevitable result where the medicines are empirically given—that is, without reference to the nature of the stone and the condition of the urine, and where the procedure cannot be watched and regulated on the principles laid

down above. But, say you, this is a mere *à priori* statement, and looks very plausible, no doubt ; but how do you know that this happens ? I will give you two instances which will suffice, and can give more, if required. Several years ago a man came to me from Yorkshire, who, having had symptoms of stone for a considerable time, was advised to take some well-known solvent for his malady. Accordingly he did so, and you will agree with me probably that he took enough to ensure it a fair trial, for he swallowed twenty-five pounds' worth of that very constitution water a sample of which you see before you on the table. He was relieved, but his life was necessarily an active one, and he had not the means of repose and the luxurious surroundings which Horace Walpole had, and his stone symptoms ultimately got worse. At last he came to me, and I crushed for him a large mixed calculus, the greater portion of which was phosphatic. Had he come to me before, it would have been a smaller one. The case did well, and the man lives at this day to tell the tale, and, if necessary, he is ready to tell it again. Since that time I have seen more painful illustrations of the mischief done by this nostrum ; one case especially, within the last

few months, in which death was due to a large phosphatic stone produced through the action of the alkali taken. It was formed upon a small uric-acid calculus, which could have been crushed with ease and safety in three minutes when I first detected it, and recommended that course. But the patient preferred the 'solvent,' and in about two years filled his bladder with a phosphatic mass which cost him his life.

Now, mind, I do not venture to say that a calculus has never been dissolved, or that it is impossible to dissolve a small uric-acid calculus by alkaline agents taken internally. I will go further, and express my belief that, given abundance of time and careful supervision, it may perhaps be possible. Nay, I will do more: the first case of such a kind that comes into the hospital, the patient consenting, I shall be pleased to submit him for the sake of experiment to the process, and to give it a fair trial. But this I say with certainty, that there is no evidence whatever that one case in a thousand of those who have swallowed solvents for the stone has been cured of it, during all past experience down to this day. No man who deliberately takes solvents for even a small calculus

the characters of which have not been carefully determined, can reckon on any better chance than this—viz. that it is a hundred to one against their success, and that it is more than probable that his stone will grow bigger during the process. And if the stone be large, the solution is impossible.

What is the value of the treatment in question? It is impossible to say more than that it may be valuable, not for stone in the bladder, but for that earlier stage of the same malady—stone in the kidney. That is the period of its history in which to attack the stone by solvents. When small uric-acid calculi are passing periodically or occasionally, much may be done: first, and chiefly, by preventive treatment, on principles I have already explained to you in the preceding lectures devoted to that subject; and if that be insufficient alone, secondly, by combining perhaps therewith some alkaline treatment. Granted proper constitutional treatment of the complaint in the early stage, there ought rarely to be much trouble with stone in the bladder. I confidently anticipate a future in which any severe operation for stone will be rare. Uric-acid stones only, as you know, are amenable to the

process by solution ; but, happily, they form the very large majority of renal calculi.

I must say a few words about agents to be used locally in the bladder for the solution of phosphatic formations which are not dissolved, but rather increased, by the internal remedies already described. You know that there are many patients, chiefly those who are unable to empty the bladder except by catheter, who are very prone to form calculous matter of the mixed phosphates, and this sometimes at a rapid rate. For these persons various solutions injected into the bladder may be valuable. The patient may be taught to administer them himself ; numbers have been taught in my wards. Once or twice a day, after withdrawing all the urine by catheter, he applies to the end of it a four-ounce bottle, with a stopcock, containing a solution of acetate of lead, about one-third or one-half a grain to the ounce of distilled water together with some acetic acid. He throws in half the contents, and allows it to issue, carrying out with it some small debris perhaps. He next injects the second half, and allows it to remain there. This does something to prevent the formation of phosphatic

calculus, or, at all events, of the aggregation of its elements in the bladder. I have no intention to describe now at length the methods of mechanically dissolving or washing out these matters, when the above simple means are unsuccessful. More complete details in reference to this subject will be found in its proper place.

I must not omit to name the agency of electricity, which has also been locally employed, both for uric-acid and for phosphatic stones. Prévost and Dumas (1823) attempted direct solution of a stone in the bladder by the galvanic current, a plan which was more fully developed here by Dr. Bence Jones (1852). The amount of instrumental manipulation, however, necessary to bring the wires into contact with the stone and to maintain them there during the period necessary for its solution is considerably greater than that required to crush the stone by the modern method of lithotritry, and must therefore be regarded at present as inapplicable.

And now comes the inevitable final conclusion—inevitable because true. It has been shown that there is no chance for the dissolution of any but a small stone, and this provided only that it exists in the most favourable circumstances; and lastly, that

in order to accomplish the task a considerable period of time must be devoted to the process.

For such a stone, gentlemen, but one brief sitting by lithotrity is necessary. No operation in the whole range of surgery is more certainly safe, rapid, and successful; and no other proceeding ought to be resorted to or even considered. I repeat the statement, that such a case I have never lost in the whole course of my experience. Nevertheless, a patient sometimes desires to be heard in relation to the course proposed, although he may be absolutely ignorant of the matter. He claims the right to exercise a choice, although he may not always manifest his wisdom in doing so. In these circumstances it becomes our duty to help him to form a just estimate of the relative merits of both methods; what these are I have thus endeavoured impartially to set before you.

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